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CLAIMS

1. A method of encoding speech packets into blocks in a packet switched network, each speech packet including a speech header and a payload comprised of a speech frame, wherein at least two speech frames are encoded into a single block, characterised in that each speech frame includes a set of Class I bits and a set of Class II bits, the method further comprising: encoding a first speech packet by encoding at least a portion of the header and the set of Class I bits; encoding a second speech packet by encoding at least a portion of the header and the set of Class I bits.

2. The method of claim 1 wherein each speech frame is associated with different users.

3. The method of claim 1 wherein each speech frame is associated with the same user.

4. The method of claim 3 wherein a speech header associated with only one speech frame is encoded.

5. The method of any one of claims 1 to 4 wherein each speech frame is generated by a full-rate encoder.

6. The method of claim 5 when dependent upon claim 3 wherein two speech frames are encoded into a block without puncturing.

7. The method of any one of claims 1 to 4 wherein each speech frame is generated by a half-rate encoder.

8. The method of claim 7 in which four speech frames are encoded into a block.

9. The method of any preceding claim wherein the speech frames are for transmission on the down-link of a wireless packet switched network.

10. The method of any preceding claim wherein each encoding step comprises encoding two different portions of each header using two different encoding techniques.

11. The method of any preceding claim wherein the Class I bits and a portion of each header are encoded using a convolution code.

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12. The method of any of claims 10 or 11 wherein the remainder of the header is encoded using a block code.

13. The method of any one of claims 9 to 12 in which the two speech frames are arranged, prior to encoding, such that they are adjacent.

14. The method of any one of claims 9 to 13 in which the two speech frames are arranged, prior to encoding, such that the Class I bits of the two users are adjacent thereby forming a first and second set of sequential Class I bits.

15. The method of any one of claims 9 to 13, in which the last n bits of the first sequential set of Class I bits are removed prior to encoding, wherein the n bits correspond to n zero bits provided for an encoder with a constrain length of n+1.

16. The method of any one of claims 9 to 15 in which the coding step further involves the step of puncturing bits.

17. The method of claim 16 wherein only the convolution code for encoding the Class I bits involves puncturing of bits.

18. The method of any one of claims 1 to 8 wherein the speech frames are for transmission on the up-link of the packet radio network, wherein the Class I bits and the header are encoded using a convolution code.

19. The method of any preceding claim in which the single block includes a set of spare bits.

20. The method of any one of claims 1 to 8 wherein the speech frames are for transmission on the up-link of the packet radio network.

21. The method of claim 20 wherein the Class I bits and the header of each speech frame are encoded using a convolution code.

22. The method of claim 21, the encoding step further involving the step of puncturing bits.

23. The method of any preceding claim in which the single block additionally includes a set of stealing bits.

The use of more powerful channel encoding techniques generates a larger number of encoded bits. If the number of bits encoded exceeds the number of bit spaces available, then puncturing is usually applied to remove certain bits. A performance trade off therefore exists between providing a powerful channel coding technique, but minimising the number of bits to be punctured.

It is therefore an object of the present invention to provide an improved encoding technique suitable for efficient channel encoding of voice on an EDGE network.

Summary of the Invention

According to the present invention there is provided in a packet switched network a method of encoding speech packets into blocks, each speech packet including a speech header and a payload comprised of a speech frame, wherein at least two speech frames are encoded into a single block.

Each speech frame may be associated with a different user. Each speech frame may be associated with the same user. A speech header associated with only one speech frame may be encoded. Each speech frame may be generated by a full-rate encoder. Two speech frames may be encoded into a block without puncturing. Each speech frame may be generated by a half-rate encoder. Four speech frames may be encoded into a block. Each speech frame may include a set of Class I bits and a set of Class II bits, the method further comprising: encoding a first speech frame by encoding at least a portion of the header and the set of Class I bits; encoding a second speech frame by encoding at least a portion of the header and the set of Class I bits.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Brief Description of the Figures

Figures 1(a) and (b) illustrate a first example of a header structure for transmitting voice over an EDGE network;

Figures 2(a) and (b) illustrate a second example of a header structure for transmitting voice over an EDGE network;

Figures 3(a) and (b) illustrate a third example of a header structure for transmitting voice over an EDGE network;

Figures 4(a) and (b) illustrates system performance improvements using the header of Figure 3;

Claims

1. In a packet switched network a method of encoding speech packets into blocks, each speech packet including a speech header and a payload comprised of a speech frame, wherein at least two speech frames are encoded into a single block.
2. The method of claim 1 wherein each speech frame is associated with different users.
3. The method of claim 1 wherein each speech frame is associated with the same user.
4. The method of claim 3 wherein a speech header associated with only one speech frame is encoded.
5. The method of any one of claims 1 to 4 wherein each speech frame is generated by a full-rate encoder.
6. The method of claim 5 when dependent upon claim 3 wherein two speech frames are encoded into a block without puncturing.
7. The method of any one of claims 1 to 4 wherein each speech frame is generated by a half-rate encoder.
8. The method of claim 7 in which four speech frames are encoded into a block.
9. The method of nay one of claims 2 to 8 wherein each speech frame includes a set of Class I bits and a set of Class II bits, the method further comprising: encoding a first speech frame by encoding at least a portion of the header and the set of Class I bits; encoding a second speech frame by encoding at least a portion of the header and the set of Class I bits.
10. The method of any one of claims 2 to 9 wherein the speech frames are for transmission on the down-link of a wireless packet switched network.
11. The method of claim 9 or claim 10 wherein each encoding step comprises encoding two different portions of each header using two different encoding techniques.
12. The method of any one of claims 9 to 11 wherein the Class I bits and a portion of each header are encoded using a convolution code.
13. The method of any one of claims 11 to 12 wherein the remainder of the header is encoded using a block code.
14. The method of any one of claims 10 to 13 in which the two speech frames are arranged, prior to encoding, such that they are adjacent.

15. The method of any one of claims 10 to 14 in which the two speech frames are arranged, prior to encoding, such that the Class I bits of the two users are adjacent thereby forming a first and second set of sequential Class I bits.

16. The method of any one of claims 10 to 15, in which the last n bits of the first sequential set of Class I bits are removed prior to encoding, wherein the n bits correspond to n zero bits provided for an encoder with a constrain length of n+1.

17. The method of any one of claims 10 to 16 in which the coding step further involves the step of puncturing bits.

18. The method of claim 17 wherein only the convolution code for encoding the Class I bits involves puncturing of bits.

19. The method of any one of claims 2 to 9 wherein the speech frames are for transmission on the up-link of the packet radio network, wherein the Class I bits and the header are encoded using a convolution code.

20. The method of any preceding claim in which the single block includes a set of spare bits.

21. The method of any one of claims 2 to 9 wherein the speech frames are for transmission on the up-link of the packet radio network,

22. The method of claim 21 wherein the Class I bits and the header of each speech frame are encoded using a convolution code.

23. The method of claim 22, the encoding step further involving the step of puncturing bits.

24. The method of any preceding claim in which the single block additionally includes a set of stealing bits.